

Radionuclides Implementation Strategy

**Infrastructure Finance
Conference
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Radionuclides Rule Review

- Sets a new MCL for:
 - Uranium (30 $\mu\text{g/L}$)
- Retains the existing MCLs for:
 - Radium-226/228
 - 5 pCi/L
 - Gross alpha particle radioactivity
 - 15 pCi/L
 - Beta particle and photon activity
 - 4 mrem/yr
- Revises monitoring requirements
 - Standardized monitoring framework

Features of the New Rule

- For the first time, there is an MCL for uranium. While it is listed as a mass unit ($\mu\text{g/L}$), a conversion to pCi/L must be used to relate it to the activity of gross alpha particle activity.
- Radium-228 must be tested separately during the initial monitoring phase (12/8/03-12/31/07).
- Each entry point to the distribution system (EPTDS) must be monitored in the New Rule instead of a “representative” point.

Standardized Monitoring Framework - Radionuclides

Compliance Period 2002-2004		Compliance Period 2005-2007					Compliance Period 2008-2010		Compliance Period 2011-2013		Compliance Period 2014-2016			
Grandfather Data		Initial Monitoring		Monitoring Results		First Compliance Cycle								
6/00 12/8/03		2003 2007				08	09	10	11	12	13	14	15	16
				< Detect Limit										
				≥ Detect Limit but ≤ ½ MCL										
				> ½ MCL but ≤ MCL										
				> MCL										

Disposal of Water Treatment Plant Waste Containing Radionuclides

Options for Disposal are Influenced by. . .

- Concentration of radionuclides and co-occurring contaminants in the waste stream
 - Hazardous Waste
 - Technologically Enhanced Naturally Occurring Radioactive Material (TENORM)
 - Low-Level Radioactive Waste (LLRW)
 - Mixed Waste
- Federal, State, & Local Regulations
 - Disposal facility policies
- Type of residuals
 - Liquid or solid

Definitions for Waste

Technologically Enhanced Naturally
Occurring Radioactive Material
(TENORM)

Low-Level Radioactive Waste (LLRW)

TENORM

Regulated by numerous federal regulations

- Defined as naturally occurring materials whose radionuclide concentrations or potential for exposure is enhanced as a result of human activities
 - Includes waste streams generated by water treatment plants
 - Also includes mining, fertilizer production, and oil and gas production.

LLRW

- Defined by The Low-Level Radioactive Waste Policy Act
 - **NOT** high level radioactive waste, spent nuclear fuel, or byproduct material; and,
 - Anything the Nuclear Regulatory Commission (NRC)...classifies as LLRW

LLRW

- Can contain source or special nuclear material
 - Radium (Ra) is not source or byproduct material by definition
 - Uranium (U) & thorium (Th) are source material and may be subject to NRC licensing requirements

HOWEVER. . .

LLRW: Uranium & Thorium

- If U or Th makes up $<0.05\%$ by weight (totaling less than 15 lbs.), it is source material an “unimportant quantity” and exempt from NRC Regulations
 - Approximately 335 pCi/g for natural U

Residual Type

Solid Residuals
Liquid Residuals

Waste Streams

■ Liquid Residual Stream

- Brine
- Backwash Water
- Rinse Water
- Acid Neutralization Water
- Concentrate

■ Solids

- Spent Resins
- Spent Filter Media
- Spent Membranes
- Sludges

Solid Residuals by Treatment Type

Treatment	Spent Resins/ Media	Spent Membranes	Sludge
IX	X		
RO		X	
AA	X		
Coagulation/Filtration	X		X
Lime Softening	X		X
Green Sand Filtration	X		X
Co-Precipitation w/Barium Sulfate	X		X
Electrodialysis/Reversal		X	
Pre-formed Hydrous Manganese Oxide Filtration	X		X

Liquid Residuals by Treatment Type

Treatment	Brine	Backwash	Rinse Water	Acid Neutral Water	Concentrate
IX	X	X	X		
RO					X
AA		X	X	X	
Coagulation/Filtration		X			
Lime Softening		X			
Green Sand Filtration		X			
Co-Precipitation w/Barium Sulfate		X			
Electrodialysis/Reversal					X
Pre-formed Hydrous Manganese Oxide Filtration		X			

Disposal Options


Direct Discharge
Discharge to POTW
Underground Injection
Landfill

Disposal Options

Residual Waste	Disposal Options				
	Direct Discharge	Discharge to POTW	Recycle	Underground Injection / Discharge Plan	Landfill
Liquids	X	X	X	X	
Sludge					X
Spent Media					X
Spent Membranes					X


Other Options?

- Incineration
- Evaporation ponds
- Surface impoundments
- Sludge dewatering



Intermediate processing methods each creating its own residual stream

- Landspreading or soil mixing



Not encouraged unless there is a demonstrated benefit and the benefits are weighed against potential hazards & risks

Liquids: Direct Discharge

- CWA
 - Need accessible and appropriate receiving body
 - Must have a National Pollutant Discharge Elimination System (NPDES) permit
 - Federal NPDES regulations do not set specific limits on radionuclides in discharges but:
 - State anti-degradation policies
 - Source water protection policies
 - Co-occurring contaminant limits set in NPDES
- May limit the use of this disposal option

Liquids: POTW

- Discharges to a POTW
 - POTW will have NPDES permit
 - System may need local permit or contract
 - Both the system and the POTW are responsible for:
 - Preventing the introduction of any pollutants that may interfere with the POTW treatment process, contaminate POTW sewage sludge, or violate POTW's NPDES permit
 - Meeting technically based local limits (TBLLs)
 - Meeting pretreatment regulations
- POTW owners can refuse to accept waste

Liquids: GW Discharge

- Discharges to a land area/pond
 - PWS will have to obtain a discharge permit
 - PWS will have to file Notice of Intent to Discharge.
 - GWQB will review.
 - Need to determine that it has “no detrimental effect” on existing GW quality.

Solids: Landfill

- Determine if the waste is hazardous through knowledge of the waste generation process, analytical testing, or both
 - Toxicity Characteristic Leaching Procedure (TCLP) (EPA Method 1311)
- Determine if waste contains any “free liquids”
 - Perform the Paint Filter Liquids Test (or PFLT; EPA SW 846 Method 9095)
 - Conduct intermediate processing to remove any liquids
- No federal requirement to test residuals specifically for radionuclides
- No specific federal regulation governing landfill disposal of water treatment plant solids or sludges containing TENORM

Solid Waste Landfill

- Municipal solid waste landfills may accept:
 - Non-hazardous, solid, TENORM wastes from all water systems
 - Hazardous waste from Conditionally Exempt Small Quantity Generators
- Industrial solid waste landfills may also accept:
 - Non-hazardous solid TENORM waste

Hazardous Waste Landfill

- May accept hazardous waste from all generator classes
 - Hazardous waste from Large and Small Quantity Generators must meet RCRA Land Disposal Restriction requirements (40 CFR 268.40)
- Some hazardous waste landfills have explicit permit conditions while others may have to request state approval before accepting TENORM wastes

LLRW Landfills

- Licensed by NRC or by a state under agreement with NRC
- Barnwell - South Carolina
 - After June 30, 2008, will accept waste only from organizations in South Carolina, Connecticut, and New Jersey
- Richland - Washington
 - Accepts certain types of TENORM (although not hazardous or mixed) wastes from all states
- Envirocare - Utah
 - Has dedicated TENORM disposal and is the only LLRW landfill authorized to accept certain kinds of mixed waste

New Mexico Regulations & Regulatory Agencies

New Mexico Radiation Control Act (74-3-1 through 74-3-16 NMSA)

■ Radiation Control Bureau

- All regulatory requirements regarding NORM resulting from drinking water sources are currently regulated under 20.3.3.3 NMAC (Licensing of Radioactive Material).
- Source Material – Uranium – exempt when concentration is by weight less than 0.05 percent of the mixture.
- By-Product Material – Radium – No exemption. Generation of radium in any quantity must be under the scope of a Specific License.

RCRA

42 USC 6901 et. seq.

■ Hazardous Waste Bureau

- The identification, management, and disposal of solid wastes (including sludge)
- If you generate solid waste, you must determine whether the waste is hazardous
 - Exhibits toxicity, corrosivity, reactivity, or ignitability criteria listed under 40 CFR 261.3(a)(2) and (b)
- Presence of radionuclides does not *ITSELF* make the waste hazardous
- “Cradle to Grave” liability

Clean Water Act (CWA)

33 USC 1251 to 1387

■ Surface Water Quality Bureau

- Direct discharges under a National Pollutant Discharge Elimination System (NPDES) permit
- Discharges to a publicly owned treatment works (POTW)
- Federal NPDES regulations do not set specific limits on radionuclides in discharges
- EPA regulations on the use and disposal of the sewage sludge produced by POTWs currently do not cover radioactive material

Water Quality Control Commission

20.6.2 NMAC

■ Groundwater Quality Bureau

- Regulate all discharges to groundwater
 - Land Application
 - Underground Injection (UIC)
 - Surface impoundments
- Goal is to protect the environmental quality of New Mexico's ground water resources as mandated by the Water Quality Act

Environmental Improvement Board Solid Waste Act, NMSA 1978.

■ Solid Waste Bureau

- There are currently no regulatory guidelines for the disposal of NORM waste materials at local solid waste disposal facilities in the State of New Mexico.
- A minimum value has not been established for radioactive material.
- All “radioactive material” is prohibited at solid waste facilities.

Other Agencies

- **Occupational Health & safety Bureau**
- **NM Department of Transportation**
- **Rocky Mountain Low Level Radioactive Waste Board**

STATE STRATEGY

- 95% of Initial Sampling Completed.
- Drinking Water Bureau developing Implementation Strategy.
 - Targeting Completion by December 2007
 - Working with other NMED Bureaus.
 - Already completed Coordination with Radiation Control Bureau
 - Incorporating Identified Impacts in Engineering Reviews for new construction.
 - Stakeholder Input

Questions

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